Sustainable Land Imaging Users Forum

Operational Uses of Landsat Data

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Session Overview

Objectives

- Have a dialog with the user community to discuss user requirements and their relationship to the performance characteristics of operational land imaging systems and the effects that changes in these characteristics produce with regard to support for users' data applications
- Discuss use cases which help illustrate and synthesize user requirements to support use by the Architecture Study Team in the assessment of various trade spaces associated with architecture concepts for a sustainable land imaging program for the Nation.
  - Implementation strategies that could spur innovation & increase efficiencies
  - Consider international and private sector collaborations
  - Integration of hyperspectral data where appropriate
  - Lowering the cost of the system is an important goal
- Three basic study tenets for the program
  - Sustainability
  - Continuity
  - Reliability

Performance Characteristics from USGS RFI in 2012

Table 2. Spectral and Radiometric Requirements for Surveyed Applications		Required						Desired	
		Spectral Requirements						Radiometric Requirements	
Application	Information Product	VIS	NIR	SWIR	TIR	Red Edge	Other	Calibration	Bit depth/SNR
National Land Cover Database (NLCD)	Cover Type/Change	■	■	■				< 5% rad	
	% Treecover	■	■	■				< 5% rad	
	% Impervious	■	■	■	■			< 5% rad	
USGS/USFS Landfire	Vegetation characteristics	■	■	■	■			< 5% rad	8-bits
	Disturbance	■	■	■	■			< 5% rad	8-bits
Burned Area Emergency Response (BAER)	Burn severity maps (dNDVI, dNBR)	■	■	■					
FAO FRA Forest Change	Forest change maps	■	■	■				< 5% rad	
Foreign Agricultural Service (FAS)	Crop area	■	■	■					
	Crop production	■	■	■		■			
	Crop health	■	■	■		■			
National Agricultural Statistical Service (NASS)	National cropland data layer (crop type)	■	■	■					
USDA Crop Insurance/Disaster	Verification of Crop Insurance/Disaster Claims	■	■	■					
Western States Evapotranspiration	Land surface temperature				■			<2% rad TOA	NEdT<1.5K
	Surface reflectance	■	■	■				<5% SR	
	NDVI	■	■					<5% SR	
	Cloud/shadow mask	■	■		■				
USDA Tillage/Residue Monitoring	Crop residue		■	■			■		>250 SNR
Landsat Image Mosaic of Antarctica (LIMA)	Ice sheet features		■					< 5% rad	12-bits
Minnesota Lake Clarity Monitoring	Water clarity	■					■	0.5% (?) TOA	12-bits
USFS Forest Management	Terrestrial Ecologic Unit Inventory	■	■	■				<5% TOA	12 bits
	Mid-level Vegetation classification	■	■	■				<5% TOA	12 bits
	National insect disease risk map (NIDRM)	■	■	■				<5% TOA	12 bits
	Post-storm damage assessment	■	■	■				<5% TOA	12 bits
	Rapid Assessment of Vegetation Post-fire (RAVG)	■	■	■				<5% TOA	12 bits
MDA/NGA Land Change	Correlated land change (new construction)	■	■	■	■			stable TOA	> 11 bits
Ohio Agricultural Tax Verification	NDVI (to establish presence of crops)	■	■						
USGS Volcano monitoring	At-sensor radiance (plumes, minerals)	■	■	■	■		■	<4% rad	
	Surface temperature				■		■	<4% rad	
USGS Flood Monitoring	At-sensor radiance (flooded area)	■	■	■	■			<4% rad	> 10 bits
USGS Essential Climate Variables (ECVs)	Surface reflectance	■	■	■				<5% rad	> 10 bits
	Surface temperature				■			<2% rad	> 10 bits
	Land cover & surface water extent	■	■	■	■			<5% rad	> 10 bits
	LAI/fPAR	■	■	■				<5% rad	> 10 bits

Performance Characteristics from USGS RFI in 2012

Table 3. Temporal Revisit and Spatial Resolution Requirements for Surveyed Applications

Required / Desired

Application	Information Product	Revisit (days)	Resolution (m)	Geolocation (m)	Revisit: < 4d	< 8d	<16d	<30d	Resolution: <10m	<20m	<30m	<60m	< 100m
National Land Cover Database (NLCD)	Cover Type/Change	16	30	<15 m			R				R		
	% Treecover	16	30	<15 m			R				R		
	% Impervious	16	30	<15 m			R				R		
USGS/USFS Landfire	Vegetation characteristics	8	30	< 0.5 pix		R					R		
	Disturbance	8	30	< 0.5 pix		R					R		
Burned Area Emergency Response (BAER)	Burn severity maps (dNDVI, dNBR)	8 (4)	10 to 60	0.5 to 1.0 pix	D	R			R	R	R	R	
FAO FRA Forest Change	Forest change maps	16	30	< 0.5 pix			R				R		
Foreign Agricultural Service (FAS)	Crop area	7	30	coreg/ortho		R					R		
	Crop production	7	30	coreg/ortho		R					R		
	Crop health	7	30	coreg/ortho		R					R		
National Agricultural Statistical Service (NASS)	National cropland data layer (crop type)	5	30	coreg/ortho		R					R		
USDA Crop Insurance/Disaster	Verification of Crop Insurance/Disaster Claims	7	30	coreg/ortho		R					R		
Western States Evapotranspiration	Land surface temperature	16 (4)	30 to 120	< 15m	D		R				D	R	R
	Surface reflectance	8	30	< 15m		R					R		
	NDVI	8	30	< 15m		R					R		
	Cloud/shadow mask	8	30	<15m		R					R		
USDA Tillage/Residue Monitoring	Crop residue	8	30 to 60			R					R	R	
Landsat Image Mosaic of Antarctica (LIMA)	Ice sheet features	30 (7)	15	<50m (15m)		D		R		R			
Minnesota Lake Clarity Monitoring	Water clarity	8 (4)	50(30)	< 10m	D	R					D	R	
USFS Forest Management	Terrestrial Ecologic Unit Inventory	8	5 to 30	< 0.5 pix		R			R	R	R		
	Mid-level Vegetation classification	8	10 to 30	< 0.5 pix		R				R	R		
	National insect disease risk map (NIDRM)	8 (4)	30	< 0.5 pix	D	R					R		
	Post-storm damage assessment	4	30	< 0.5 pix	R						R		
	Rapid Assessment of Vegetation Post-fire (RAVG)	4	30	< 0.5 pix	R						R		
MDA/NGA Land Change	Correlated land change (new construction)	30 (8)	30 (15)			D	D	R		D	R		
Ohio Agricultural Tax Verification	NDVI (to establish presence of crops)	16	30			D	R				R		
USGS Volcano monitoring	At-sensor radiance (plumes, minerals)	16 (8)	30 (15)	< 0.5 pix		D	R			D	R		
	Surface temperature	16 (8)	60 to 90	< 0.5 pix		D	R					R	R
USGS Flood Monitoring	At-sensor radiance (flooded area)	8	30 (15)	< 0.5 pix		R				D	R		
USGS Essential Climate Variables (ECVs)	Surface reflectance	8	30			R					R		
	Surface temperature	8	120			R							R
	Land cover & surface water extent	16	30				R				R		
	LAI/fPAR	8	30			R					R		

How to Submit Feedback

- Visit http://espd.gsfc.nasa.gov/landimagingstudy/

- We post relevant materials from this User Forum
  - Applications Requirements Worksheet
  - Slides from this session
  - Document that includes questions from this session

- Mechanism for providing user feedback through the web site
  - LandImagingUserFeedback@usgs.gov